Light Transport Techniques for Tensor Field Visualization

Master's Thesis Presentation

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Related Work - Symmetric Tensor Field Visualization

- glyphs[1]: represent anisotropy with shape and orientation
- tensor field lines[2] (TFLs): follow tensor field along major eigenvector
- tensor field topology[3]: e.g. separatrices, degenerate points
- tensorlines[4]: introduce artificial inertia to TFLs to increase stability
- HyperLIC[5]: use Line Integral Convolution from vector field visualization on TFLs
- FTLE[6]: exploit the gradient of the flow map of TFLs to generate an FTLE field
- scalar measures: fractional anisotropy[7], anisotropy coefficients[8]

[1] McLoughlin et al. "Over two decades of integration-based, geometric flow visualization", 2010
[2] Vilanova et al. "Dti visualization with streamsurfaces beaand evenly-spaced volume seeding", 2004
[3] Delmarcelle and Hesselink, "Visualizing second order tensor fields with hyperstreamlines"
[4] Weinstein et al. "Tensorlines: Advection-diffusion based propagation through diffusion tensor fields", 1999
[5] Zheng and Pang "HyperLIC", 2003
[6] Hlawatsch et al. "Coherent structures of characteristic curves in symmetric second order tensor fields", 2011
[7] Basser "Microstructural and physiological features of tissues elucidated by quantitative-diffusion-tensor MRI", 1996
[8] Westin et al. "Geometrical diffusion measures for MRI from tensor basis analysis", 2002